IMAGE COMPENSATING METHOD

This application claims the benefit of Taiwan application Serial No. 091132212, filed October 30, 2002.

BACKGROUND OF THE INVENTION

1. Field of the Invention:

[0001] This invention relates to an image compensating method, and more particularly, the invention relates to an image compensating method that can use the correctional gray level value of complete black or white, which is measured from the patterns of longitudinal black and white, complete white, or complete black, and that can compare the correctional gray level values with the theoretical gray level values of the complete black or white, so as to adjust the brightness of the scanned image.

2. Description of Related Art:

[0002] FIG. 1 is a perspective view schematically illustrating a conventional scanner 100. As shown in FIG. 1, the scanner 100 includes a base 102 and a cover 104, in which one end of the cover 104 is connected with an end of the

base 102 via a hinge device 106 so that the cover 104 can be opened and closed on the base 102.

[0003] The base 102 includes a top 108, a scanning platform 110, a chassis 114, a transverse complete white pattern 116, and the top 108, which is located on the base 102. The scanning platform 110 can also be situated on the top 108, so as to align a document 112. Wherein, the chassis 114 is located inside of the base 102 in a movable manner, so that the chassis 114 can be moved along the direction of arrow 105 in order to scan the document 112, as shown in FIG. 1, when the cover 104 and the base 102 are closed. In addition, the transverse complete white pattern 116 is located on an inner wall of the top 108 near an end of the scanning platform 110 and is used to allow the scanner 100 to perform a correction on the image before the chassis 114 starts to scan the document 112. A gray level correction value is obtained and is used as the standard for adjusting the gray level value of the image when the chassis 114 of the scanner 100 begins scanning the document 112.

[0004] It should be noted that when the chassis 114 of the scanner 100 scans the document 112, the gray level value of the image could be adjusted according to the correctional gray level value. However, the intense light needed for the scanning operation and the scattering light in the environment

during the scanning process can affect the gray level value of the image after the chassis 114 scans the document to obtain the gray level value of the image. Due to the faulty condition created by the light brightness error, the obtained gray level value of the image cannot be adjusted according to the correctional gray level value. This also causes a distortion on the image obtained by the scanner and consequently has a large effect on the image quality.

SUMMARY OF THE INVENTION

[0005] It is therefore an object of the present invention to provide an image compensating method. By comparing the correctional gray level value of complete black or complete white, which is the measurement on the patterns of longitudinal black and white, complete white, or complete black, with a theoretical gray level value of complete black or complete white, the image brightness obtained by the scanner is adjusted. At the same time, the light brightness errors that occur due to the light intensity needed by the scanning operation or due to the disturbance created by light scattering in the environment can be compensated. Additionally, the scanning quality can be maintained at a high level.

[0006] In accordance with the foregoing and other objects of the present invention, the invention provides an image compensating method. First, multiple scanning lines are used to scan a document and a longitudinal black and white pattern, in order to produce the actual gray level value for each of the multiple pixels with respect to each of the scanning lines and the document, and a correctional gray level value for complete black and a correctional gray level value for complete white with respect to the longitudinal black and white pattern. Then, a compensational gray level value with respect to the actual gray level value for each of the pixels is obtained according to the correctional gray level values for complete black, the correctional gray level value for complete white, the theoretical gray level values for complete black, the theoretical gray level value for complete white, and the actual gray level value for each of the pixels. Then, the process is complete.

[0007] In accordance with the foregoing and other objects of the present invention, the invention provides another image compensating method. First, multiple scanning lines are used to scan a document and a longitudinal complete white pattern, in order to produce the actual gray level value for each of the multiple pixels with respect to each of the scanning lines and the

document, and a correctional gray level value for complete white with respect to the longitudinal complete white pattern. Then, a compensational gray level value with respect to the actual gray level value for each of the pixels is obtained according to the correctional gray level value for complete white, the theoretical gray level value for complete white, and the actual gray level value for each of the pixels. Then, the process is complete.

[0008] In accordance with the foregoing and other objects of the present invention, the invention further provides another image compensating method. First, multiple scanning lines are used to scan a document and a longitudinal complete black pattern, in order to produce the actual gray level value for each of the multiple pixels with respect to each of the scanning lines and the document, and a correctional gray level value for complete black with respect to the complete black longitudinal pattern. Then, a compensational gray level value with respect to the actual gray level value for each of the pixels is obtained according to the correctional gray level value for complete black, the theoretical gray level value for complete black, and the actual gray level value for each of the pixels. Then, the process is complete.

BRIEF DESCRIPTION OF DRAWINGS

[0009] The invention can be more fully understood by reading the following detailed description of the preferred embodiments, with reference made to the accompanying drawings, wherein:

[0010] FIG. 1 (prior art) is a perspective view schematically illustrating a conventional scanner;

[0011] FIG. 2 is a drawing schematically illustrating a scanner with a longitudinal black and white pattern according to the preferred embodiment of the present invention;

[0012] FIG. 3 is a flow diagram schematically illustrating an image compensating method according to a first preferred embodiment of the present invention;

[0013] FIG. 4 is a flow diagram schematically illustrating an image compensating method according to a second preferred embodiment of the present invention; and

[0014] FIG. 5 is a flow diagram schematically illustrating an image compensating method according to a third preferred embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0015] FIG. 2 is a drawing schematically illustrating a scanner with a longitudinal black and white pattern according to the preferred embodiment of the present invention. As shown in FIG. 2, the scanner 200 at least includes a top 208, a scanning platform 210, a chassis 214, and a longitudinal black and white pattern 218. Wherein, the scanning platform 210 is located on the top 208, so as to be aligned with a document. The chassis 214 can be moved under the top 208 so that the chassis 214 can be moved forward and backward in the direction indicted by the arrow 250 in FIG. 2. As a result, the document 212 and the longitudinal black and white pattern 218 can be scanned.

[0016] In this embodiment, the longitudinal black and white pattern 218 is specifically located on an inner wall of the top 208 on a side near the scanning platform 210 to allow the scanner 200 to perform image brightness compensation when the chassis 214 scans the document 212. Besides, the longitudinal black and white pattern 218 has a length greater than or equal to the length of the scanning platform 210.

[0017] FIG. 3 is a flow diagram schematically illustrating an image compensating method according to a first preferred embodiment of the present invention. Also referring to FIG. 2 at the same time, as shown in FIG. 3, during step 302 multiple scanning lines are used first to scan a document 212 and a longitudinal black and white pattern 218, in order to produce the actual gray level value of multiple pixels with respect to each of the scanning lines and the document 212, and a correctional gray level value for complete black as well as a correctional gray level value for complete white with respect to the longitudinal black and white pattern 218.

[0018] The process then goes to step 304 during which a compensational gray level value with respect to the actual gray level value for each of the pixels is obtained according to the correctional gray level value for complete black, the correctional gray level value for complete white, a theoretical gray level value for complete black, a theoretical gray level value for and complete white, and the actual gray level value for each of the pixels. Then, the process is complete. Wherein, a calculation in the embodiment is performed where [(each of the actual gray level values with respect to each of the pixels – the correctional gray level value for complete black) / (the correctional gray level value for complete white – the correctional gray level value for

complete black) × (the theoretical gray level value for complete white – the theoretical gray level value for complete black)]. As a result, the compensational gray level value is obtained. If taking 8 bits as a standard, the gray level value will fall into a range of 0 – 255. In this embodiment, the theoretical gray level value for complete white and the theoretical gray level value for complete black are set at 255 and 0, respectively.

[0019] If the longitudinal black and white pattern 218 in FIG. 2 is changed to a longitudinal complete white pattern, the present invention also provides another image compensation method, as shown in FIG. 4. In FIG. 4, during step 402, multiple scanning lines are used first to scan a document and a longitudinal complete white pattern, in order to produce the actual gray level value for each of multiple pixels with respect to each of the scanning lines and the document, as well as a correctional gray level value for complete white with respect to the longitudinal complete white pattern. The process then goes to step 404, where a compensational gray level value with respect to the actual gray level value for each of the pixels is obtained according to the correctional gray level value for complete white, a theoretical gray level value for complete white, and the actual gray level value for each of the pixels. Then, the process is complete. Wherein, a calculation in the embodiment is

performed where [each of the actual gray level values with respect to each of the pixels × (the theoretical gray level value for complete white / the correctional gray level value for complete black)]. As a result, the compensational gray level value is obtained. If taking 8 bits as a standard, the gray level value will fall within a range of 0 – 255. In this embodiment, the theoretical gray level value for complete white and the theoretical gray level value for complete black are set at 255 and 0, respectively.

[0020] If the longitudinal black and white pattern 218 in FIG. 2 is changed to a longitudinal complete black pattern, the present invention also provides another image compensation method, as shown in FIG. 5. In FIG. 5, during step 502, multiple scanning lines are used first to scan a document and a longitudinal complete black pattern in order to produce the actual gray level value with respect to each of the scanning lines and the document, as well as a correctional gray level value for complete black with respect to the longitudinal complete black pattern. The process then goes to step 504, where a compensational gray level value with respect to the actual gray level value for each of the pixels is obtained according to the correctional gray level value for complete black, a theoretical gray level value for complete black, and the actual gray level value for each of the pixels. Then, the process is

complete. Wherein, a calculation in the embodiment is performed where [each of the actual gray level values with respect to each of the pixels – (the correctional gray level value for complete black – the theoretical gray level value for complete black)]. As a result, the compensational gray level value is obtained. If taking 8 bits as a standard, the gray level value will fall within a range of 0 – 255. In this embodiment, the theoretical gray level value for complete white and the theoretical gray level value for complete black are set at 255 and 0, respectively.

[0021] In conclusion, the image compensating method has been disclosed by the foregoing embodiments of the present invention. By comparing the correctional gray level value for complete black or complete white, which is the measurement on the patterns of longitudinal black and white, complete white, or complete black, with theoretical gray level value for complete black or complete white, the image brightness obtained by the scanner is adjusted. At the same time, the light brightness errors that occur due to the light intensity needed by the scanning operation or due to the disturbance of the scattering light from the environment can be compensated. The scanning quality can also be maintained at a high level.

[0022] The invention has been described using exemplary preferred embodiments. However, it is to be understood that the scope of the invention is not limited to the disclosed embodiments. On the contrary, it is intended to cover various modifications and similar arrangements. The scope of the claims, therefore, should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements.